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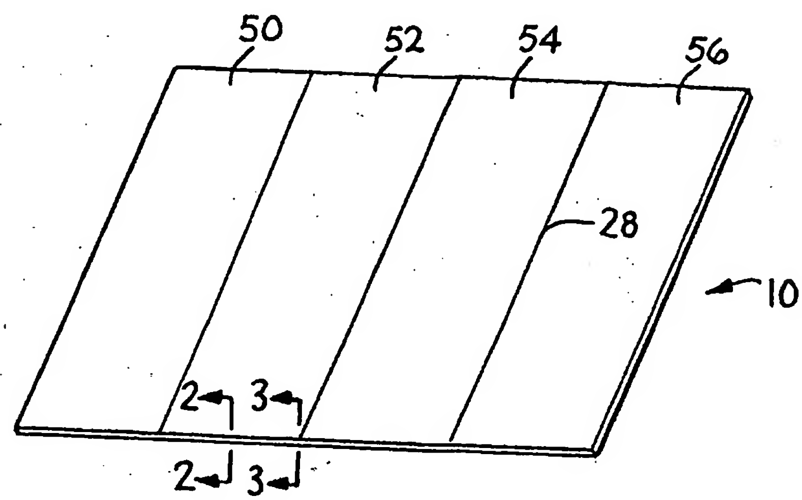
(54) **PLANCHE DE DECOUPE**
(54) **CUTTING MAT**



(57) Planche de découpe conçue pour découper des matériaux, notamment des produits alimentaires. La planche de découpe comporte une couche absorbante et peut aussi comporter une couche inférieure imperméable aux liquides, une couche antidérapante et/ou une couche supérieure.

(57) A cutting mat is disclosed which is designed for cutting of materials such as food. The cutting mat includes an absorbent layer and may include a liquid impermeable bottom layer, a non skid layer and/or a top layer.

ABSTRACT

A cutting mat is disclosed which is designed for cutting of materials such as food. The cutting mat includes an absorbent layer and may include a liquid impermeable bottom layer, a non skid layer and/or a top layer.

PATENT
12,756

CUTTING MAT

Field of the Invention

This invention relates to a mat for cutting materials which may require absorption of fluids. It is particularly directed to disposable cutting boards for use with foods.

Background of the Invention

Cutting boards are designed for cutting materials such as food on a hard surface with a sharp knife. In addition to providing a surface on which to sever the material, the boards also protect the underlying support surface. The cutting boards can be typically constructed of hard and sometimes heavy materials such as maple and other hardwoods. In addition they have been constructed of synthetic polymeric materials and corrugated cardboard. None of these cutting boards absorb the quantity of fluids which are released by many materials which are typically cut. Typical fluids which are encountered using the cutting mat include fruit, vegetable, meat and poultry fluids including blood and other animal body fluids. In addition, the fluids include fresh and salt water resulting from washing the foods and residue from the foods. Typical amounts encountered in cutting food for a family range from about 0 ml to 30 ml.

In addition, the cardboard does not provide a cutting surface which will permit cutting a number of different types of material. Problems associated with these cutting boards include staining of the nondisposable cutting surfaces, marred surfaces which have a tendency to collect bacteria, and the general collection and growth of bacteria. Some of the boards also provide inadequate protection to the underlying support surface.

Sometimes, paper towels are used in place of or on a more permanent cutting board. Problems with the use of the paper towels include not enough absorbency, no barrier to the passage of fluids through the paper towel to contaminate the permanent board and inability to withstand the cutting action applied to the surface.

Of United States patents, one which discusses cutting surfaces is U.S. 4,592,914 issued to Kuchenbecker which teaches a disposable container for microwave cooking which can be disassembled and used as a cutting surface.

In addition to the above mentioned shortcomings, the typical cutting board has a

tendency to slip on the underlying support surfaces. To overcome this, one could use pressure-sensitive adhesives. Such pressure-sensitive adhesives may be placed on the back of a cutting board for attachment of the board to the support surface. The use of such adhesives presents several disadvantages. Among the disadvantages are that the adhesive may stick too firmly to the support surface and make removal difficult. A second disadvantage is that the adhesive may discolor the support surface or leave a sticky residue. A third disadvantage is that the cutting board may tear apart at the time of removal. Furthermore, the cost of adhesives is a significant portion of the cost of the cutting board.

In addition to the pressure sensitive adhesives, U.S. patent 4,761,341 describes a temporarily bonded construction utilizing a coating of a non-pressure sensitive hot melt adhesive comprising 5-40% of specific A-B-A block copolymers and a 95-60% plasticizing oil. Additionally, the coating may incorporate a tackifying agent which is dependent upon the specific block copolymer employed. The types of rubber block copolymers useful in the coating include Kraton D and G. The types of plasticizing oils useful in the coating include petroleum derived hydrocarbon oils such as polypropylenes and polybutenes having an average molecular weight between about 350 and about 10,000. The coating is employed on a base substrate of paper, plastic, film, sheets and foils. The other surface may include plastic, metal, glass or paper as the item to be temporarily bonded to the base substrate.

Summary of the Invention

Briefly, this invention relates to cutting mats, which are designed to absorb fluid released by a material such as food. The cutting mat includes a liquid impermeable bottom layer, a top layer and an absorbent center layer which is positioned between the bottom and top layers.

In one embodiment the invention provides a cutting mat which has a surface which compares with the traditional cutting boards, yet is disposable and allows for absorption of fluids normally released during the cutting of materials.

In another embodiment the invention provides a cutting mat which is cut resistance and protects the underlying support surface.

In yet another embodiment the invention provides a cutting mat which is easy to manufacture and is relatively low in cost.

Therefore, it would be desirable to make a product which would not require a pressure-sensitive adhesive, but could adequately maintain its position with respect to

the support surface.

Still further, in another embodiment, the invention provides a cutting mat which has improved fluid absorbency features.

Other aspects and advantages of the present invention will become more apparent to those skilled in the art in view of the following description and the accompanying drawings.

Brief Description of the Drawings

Fig. 1 is a perspective top view of a cutting mat of this invention.

Fig. 2 is a cross-sectional view of a first embodiment of a cutting mat taken across absorbent portion at section 2-2 of Fig. 1.

Fig. 3 is a cross-sectional view of a second embodiment of a cutting mat taken across absorbent portion at section 2-2 of Fig. 1.

Fig. 4 is a cross-sectional view of a third embodiment of a cutting mat taken across absorbent portion at section 2-2 of Fig. 1.

Fig. 5 is a cross-sectional view of a fourth embodiment of a cutting mat taken across absorbent portion at section 2-2 of Fig. 1.

Fig. 6 is a cross-sectional view of a fifth embodiment of a cutting mat taken across absorbent portion at section 2-2 of Fig. 1.

Fig. 7 is a cross-sectional view of the fourth embodiment of a cutting mat taken across hinged portion at section 3-3 of Fig. 1 showing a gap in the absorbent layer.

Fig. 8 is a cross-sectional view of the fourth embodiment of a cutting mat taken across hinged portion at section 3-3 of Fig. 1 showing no gap in the absorbent layer.

Fig. 9 is a perspective top view of a cutting mat of this invention in the folded configuration.

Fig. 10 is a top view of shim material used in the Coefficient of Friction testing showing the dimensions of the shim material.

Fig. 11 is a side view of shim material used in the Coefficient of Friction testing showing the folded shape prior to installation on the testing sled.

Fig. 12 is a side view of sled used in the Coefficient of Friction testing showing the sled after the installation of the slim material dimension of the shim material.

Detailed Description of the Invention

Referring to Fig. 1, a cutting mat is shown which can be used in the kitchen or elsewhere to permit cutting of materials which contain or release fluids during cutting, such as food. The cutting mat 10 has a generally rectangular shape. Other shapes,

including oval and racetrack, are contemplated. The cutting mat 10 should have a thickness of less than about 15 mm, preferably less than about 10 mm, and most preferably, less than about 5 mm. The thickness is measured using a Mitutoyo Digi-Matic thickness tester series 543 with standard carbide ballpoint, part number 131262, which has a radius of 0.6 inches and an impression of 0.2 inches on cardboard, with a weight delivered at the ballpoint of 150 grams yielding a pressure of 1052 pounds per sq. inch. The thickness is an average of four or more locations on the cutting mat. The cutting mat should have a Shore hardness less than about 60 as measured on the D-scale.

Referring to Fig. 2, the cutting mat 10 includes an absorbent layer 22. Absorbent layer 22 can be any shape. The top surface of absorbent layer 22 contacts the food to be cut. The bottom surface of absorbent layer 22 will contact the support surface.

Referring to Fig. 3, the cutting mat 10 includes a top layer 20, which is liquid permeable and an absorbent layer 22. Absorbent layer 22 can be any shape and preferably does not extend beyond top layer 20. Top layer 20 has a top surface which contacts the material to be cut. The absorbent layer 22 should have the same dimensions as top layer 20. The bottom surface of absorbent layer 22 will contact the support surface.

Referring to Fig. 4, the cutting mat 10 includes an absorbent layer 22 and liquid impermeable bottom layer 24. Absorbent layer 22 can be any shape. The top surface of absorbent layer 22 contacts the material to be cut. Absorbent layer 22 can be secured, or retained, on the top side of bottom layer 24. The bottom layer should have the same dimensions as absorbent layer 22. The bottom surface of bottom layer 24 will contact the support surface.

Referring to Fig. 5, the cutting mat 10 includes a top layer 20, which is liquid permeable, absorbent layer 22, and liquid impermeable bottom layer 24. Absorbent layer 22 can be any shape and preferably does not extend beyond top layer 20. Top layer 20 has a top surface which contacts the material to be cut. Absorbent layer 22 can be secured, or retained, on the top side of bottom layer 24. The bottom layer should have the same dimensions as top layer 20. The bottom surface of bottom layer 24 will contact the support surface.

Referring to Fig. 6, the cutting mat 10 includes a top layer 20, which is liquid permeable, an absorbent layer 22, a liquid impermeable bottom layer 24 and a non skid layer 26. Absorbent layer 22 can be any shape and preferably does not extend beyond

top layer 20. Top layer 20 has a top surface which contacts the material to be cut. Absorbent layer 22 can be secured, or retained, on the top side of bottom layer 24. The bottom layer 24 should have the same dimensions as top layer 20. The non skid layer should have the same dimensions as the bottom layer 24. The bottom surface of non skid layer 26 will contact the support surface.

Referring to Figures 7 and 8, sections 52 and 54 of the cutting mat 10 are shown which contain an absorbent layer 22, top layer 20, and bottom layer 24. Also is shown a bend line 28 between sections 52 and 54. In Fig. 7, the materials used for the top layer 20 and bottom layer 24 span the gap between the absorbent layers 22b and 22c. The bend line 28 should be of such a dimension as to permit folding of the sections so that the folded mat lies flat as shown in FIG. 9. In Fig. 8, the materials used for the top layer 20, absorbent layer 22 and bottom layer 24 span the bend line 28 between mat sections 52 and 54. The materials and the manufacture techniques should be such that folding of the sections is permitted so that the folded mat lies flat as shown in Fig. 9.

In a preferred embodiment of this invention shown in Fig. 1, cutting mats are shown with four panels, 50, 52, 54, and 56 respectively. In an alternative embodiment of this invention, the number of panels can be reduced to 1 or increased to greater than 20. The size of the panels can vary in length, width, and shape. The panels are most preferably rectangular with a width dimension preferably greater than about 1 mm and less than about 1000 mm, more preferably greater than about 10 mm and less than about 500 mm, and most preferably greater than about 25 mm and less than about 200 mm, and with a length dimension preferably greater than about 1 mm and less than about 1000 mm, more preferably greater than about 50 mm and less than about 750 mm, and most preferably greater than about 200 mm and less than about 500 mm.

The most preferred method of construction is continuous attachment of the absorbent layer with no border at the edge. Typical of sealing methods include heat sealing and adhesive sealing. The cutting mat 10 may be provided with walls to further contain the fluids released during cutting. Another method is ultrasonically bonding a line inward from the edge of the cutting mat 10. When this is done, a free fringe of material may extend about a quarter inch outward from the bond line about the periphery of the product. This results in a neat bond line with less tendency for the material to be perforated than by heat sealing. The most preferred embodiment does not have a free fringe edge.

A suitable top layer 20 can be manufactured from a wide selection of web

materials, such as porous foams, reticulated foams, apertured plastic films, natural fibers, (for example, wood or cotton fibers), synthetic fibers (for example, polyester or polypropylene fibers), or a combination of natural and synthetic fibers. Various woven and nonwoven fabrics can be used for top layer 20. For example, top layer 20 may be composed of a meltblown, or spunbonded web of polyolefin fibers. The top layer may also be a bonded-carded-web composed of natural fibers, synthetic fibers, or combinations thereof. In addition top layer 20 may also be a hydroentangled natural fiber/nonwoven composite.

Top layer 20 may be composed of a substantially hydrophobic material, and the hydrophobic material may optionally be treated with a surfactant or otherwise processed to impart a desired level of wettability and hydrophilicity. Surfactants are designed to impart more hydrophilicity to hydrophobic fibers and, thereby, aid in the absorption of the liquid. Surfactant application can include topical additions or internally applied materials such as polysiloxanes. Particularly preferred are composite materials made with nonwoven and natural fibers. Combining synthetic fibers with natural fibers increases the hydrophilicity of the composite reducing or eliminating the need for surfactant, while at the same time providing high strength and durability. In a particular embodiment of the invention, top layer 20 is a hydroentangled nonwoven spunbonded polypropylene fabric composed of about 2.8 to about 3.2 denier fibers hydroentangled into a web having a basis weight of about 14 gsm bonded to pulp fibers having a basis weight of about 53 gsm using high pressure water jets. The top layer 20 may be coated with a grease or stick-resistant material, thus permitting the material which is cut to be easily removed.

Another preferred material for the top layer 20 is a spunbond web of polypropylene. The web can contain about 1% to about 6% titanium dioxide pigment to give it a clean, white appearance. A uniform spunbond material is desirable, because it has sufficient strength. The most preferred polypropylene webs have a weight of between about 14 grams per square meter to about 60 grams per square meter. An optimum weight is between about 30 grams per square meter and about 40 grams per square meter.

Liquid permeable top layers utilized on cutting mats can be comprised of a white material. White material has good fluid-masking properties and can hide the stain of liquid that has passed through it. In addition, the aesthetics of the cutting mat can be enhanced by printing graphics on the top surface of the top layer which may include

usage instructions. The top side of the top layer 20 may be provided with a decorative pattern. If desired, the pattern may be chosen such that the tear lines blend in or form a part of the pattern.

The liquid permeable top layer 20 can also contain a plurality of apertures (not shown) formed therein. With apertures present, fluids released during cutting, which are deposited at or near the apertures, rapidly migrate into the absorbent layer 22. This helps maintain a perceivably drier surface than when the apertures are not employed. Therefore, while the apertures are not essential, some functional advantages are obtained.

The absorbent materials used in the cutting mat 10 are designed to absorb the material fluids, including juices, wash water and blood. The absorbent material may be a composite comprised of a hydrophilic material that can be formed from various natural or synthetic fibers, wood pulp fibers, regenerated cellulose or cotton fibers, a blend of pulp and other fibers or meltblown polymers, such as polyester, polypropylene or coform. Coform is a meltblown air-formed combination of meltblown polymers, such as polypropylene, and absorbent staple fibers, such as cellulose. The preferred absorbent material may comprise a cellulose pulp sheet, due to its low cost, ease in processing and good absorbency. The absorbent capacity of the cutting mat as measured by the absorbent capacity test procedure described in the Examples should preferably be greater than about 1 g/g, more preferably greater than about 1.5 g/g, and most preferably greater than about 2 g/g. In the most preferred embodiment there is a single absorbent layer such as pulp sheet having a basis weight of about 300 gsm. One suitable pulp sheet is blotting paper, which can be obtained from James River Corporation among others.

The time of absorbency of the cutting mat as measured by the time of absorbency test procedure described in the Examples should preferably be less than about 1000 seconds for the absorption of 1 ml of deionized water, more preferably less than about 350 seconds for 1 ml, and most preferably less than about 100 seconds for 1 ml.

The absorbent layer 22 may contain superabsorbent particles which are extremely effective in retaining released fluids. Superabsorbents have the ability to absorb a large amount of fluid in relation to their own weight. Typical superabsorbents can absorb anywhere from about 5 to about 60 times or more their weight in fluids. However, the absorption mechanism of the superabsorbents is usually slower than the rate of fluid absorption by matrix material. The placement of the superabsorbent particles in the

central portion of the cutting mat 10 provides additional time for the superabsorbent particles to absorb the fluid temporarily retained by a transfer member.

The superabsorbents should have a high mechanical stability in the swollen state, an ability to rapidly absorb fluid, and a strong liquid binding capacity to perform well in cutting mat applications. Hydroxyfunctional polymers may be good superabsorbents for this application. The superabsorbent can be a hydrogel-forming polymer composition which is water-insoluble, slightly cross-linked, and partially neutralized. It can be prepared from unsaturated polymerizable, acid group-containing monomers and cross-linked agents. A hydrogel-forming polymer, which is a partially neutralized cross-linked copolymer of polyacrylic acid and polyvinyl alcohol, is preferred. After a polymer is formed, it is mixed with about a 1% anhydrous citric acid powder. The citric acid has been found to increase the ability of the superabsorbent to absorb blood. The finely ground, anhydrous citric acid powder, which is void of water, along with trace amounts of fumed silica, is mixed with the polymer which has been screened to an appropriate particle size. This mixture can then be formed into a composite or a laminate structure. Such superabsorbents can be obtained from Dow Chemical, Hoechst-Celanese, and Stockhausen, Inc., among others, and are a partially neutralized salt of cross-linked copolymer of polyacrylic acid and polyvinyl alcohol having an absorbency under load value above 25 g/g.

Most preferably, absorbent layer 22 will be one layer of uniform thickness. Alternately, absorbent layer 22 can be composed of two or more absorbent layers with uniform thickness and having various combinations of thickness relative to each other. Alternately, cutting mat 10 can have a uniform thickness with higher absorbency material located in the center portion than at the ends. Higher absorbency may be achieved by using fibers of greater absorbency or by adding superabsorbents to the bottom absorbent layer (the layer closer to the bottom layer 24). Alternately, a lower density in the bottom absorbent layer will distribute fluid at an increased rate in the x-y directions. The higher density bottom absorbent layer will increase fluid flow in the z direction away from the first absorbent layer, resulting in a drier first absorbent layer.

In an alternate embodiment top absorbent layers can be made up of cellulose pulp sheet and the bottom absorbent layer can be made up of meltblown polypropylene. In another embodiment, the top absorbent layer can be a composite comprised of meltblown fibers and a superabsorbent. The top absorbent layer can also be a laminate comprised of a hydrocolloid material enclosed in a hydrophilic pulp sheet. In another

embodiment; at least one of the top and bottom absorbent layers may contain, along its periphery, a fluid-tight seal which can be constructed out of a material which is the same as the bottom layer 24.

The bottom layer 24 blocks the passage of fluids and liquids from the absorbent layer 22 by being liquid impermeable. The bottom layer 24 can be made from any desired material that has these properties. A good material is a microembossed, polymeric film, such as polyethylene or polypropylene. Bicomponent films can also be used. A preferred material is polyethylene film. Most preferably, the bottom layer 24 will be comprised of a polyethylene film having a thickness in the range of from about 0.01 mm to about 0.05 mm.

The exterior surface of the bottom layer 24 may consist of a skid resistant film or a coating. The film or coating may cover substantially the entire exterior surface of the bottom layer 24 depending on the type of film or coating and the support surface. Generally, the coating is applied to a large portion of the mat's back surface. However, depending on the mat's size and the anti-skid properties of the particular coating utilized it may be necessary to only coat a portion of the back surface of the mat. In some cases it may be adequate to place patches of the film or coating on the exterior surface. The skid-resistant film or coating may be applied to any of a variety of application methods.

In the most preferred embodiment, the bottom layer 24 is a coextruded film, with a thickness of about 0.75 mils. The coextruded film may be composed of about 75% by weight layer of polyethylene and about 25% by weight layer of polyolefin. A suitable type of polyolefin is made by using Metallocene technology. A suitable coextruded film is identified by the identification number XC2-21-826.1 and is available from Consolidated Thermoplastics Company. The polyethylene liquid impermeable layer may be adhered to absorbent layer 22 with hot melt adhesive. The nonskid layer 26 preferably covers the entire exterior surface of bottom layer 24.

The materials suitable for nonskid layer 26 do preferably not adhere to the underlying support surface and may be manufactured from a wide selection of forms, such as porous foams, reticulated foams, plastic films, various woven and nonwoven fabrics, intermittent coatings, or continuous coatings. With respect to not adhering to the support surface, the force to peel the nonskid layer from the support surface should be not greater than 50 grams per inch. The peel force is that measured using a 2 mil mylar tape

peeled from the nonskid layer surface as measured by ASTM-D 3330. The materials suitable for this layer may be any polymer, hot melt, latex, or silicone which has sufficient skid resistance properties to hold the cutting mat in place with respect to the support surface during use. The nonskid layer 26 may be generally smooth, pore-free and nonporous after application to the cutting mat. Alternatively, the non-skid layer 26 can be porous such as a polyethylene foam which is adhesively attached to the bottom layer 24.

The coefficient of friction of the exterior surface of the nonskid layer 26 is measured by a modification to ASTM test number D-1894-93. ASTM test method D-1894-93 covers determination of the coefficients of starting and sliding friction of plastic film and sheeting when sliding over itself or other substances at specified test conditions. The test samples were measured by a modification of ASTM test D-1894-93. The modified test calls for determination of sliding friction of the exterior of the bottom surface layer by wrapping a 200 gram sled with brass shim stock and sliding the sled with shim stock over the test sample at 0.5 feet/minute. Using this test a coefficient of friction of greater than about 0.4 has been found to be satisfactory. A preferred coefficient of friction is greater than about 1. Preferably, the layer has a coefficient of friction of between about 0.4 and about 10.0, more preferably between about 0.6 and about 3.0, and most preferably between about 0.75 and about 2.5.

The skid resistant coatings may have any suitable composition. Generally, the following groups of materials have adequate skid-resistant properties: ethylene vinyl acetate copolymers applied as a hot melt or as a water based coating having at least 28% vinyl acetate; polyvinyl acetate in water-based emulsions; styrene-butadiene in an emulsion or as a hot melt; cellulose acetate butyrate in a hot melt; ethyl cellulose blended with a plasticizer and a resin; acrylics in an emulsion systems that are not blended; synthetic rubber (KRATON® block copolymers having elastomeric and styrenic blocks), rubber, resin, plasticizer blends and hot melts including polyethylene (alone or blended) and polyamides among others.

Typical of such compositions are the ethylene-vinyl acetate copolymers, acrylic terpolymers of methacrylic acids, acrylic copolymers, ethylene-vinyl acetate/resin latex emulsions, ethylene-vinyl acetate adhesives, synthetic rubber (block copolymers with elastomeric and styrenic components) adhesives, and polyvinyl acetate/resin emulsions. Such materials are available from H. B. Fuller Company, E.I. DuPont and Findley Adhesives, among others. Compositions of these types have found use as hot-

melt and water-based coatings for barrier coatings for nonwovens and/or papers.

The skid resistant layer 26 and the impermeable layer 24 may be unitary, i.e. one layer of material may provide both functions.

Preferably the mat is provided with tear lines running widthwise across the mat. The widthwise tear lines permit the material to be sized such that the cutting mat may be conformed to the material being cut or to conform to the surface on which the mat rests. Tearing along these lines results in a smooth, straight edges.

The tear lines are spaced at regular intervals across the surface of the mat, but typically correspond to the bend lines between sections. The tear lines may be spaced at any desired distance greater than the bend lines to give a desired degree of sizing. For example and without limitation, the tear lines may be formed at each bend line or at greater intervals. Of course, the closer the tear lines are together the closer the mat can be sized to the material to be cut.

Preferably the tear lines are not perforated so as to allow released fluids to pass through the mat to contaminate the support surface. One preferred embodiment includes a top surface which is perforated and the bottom layer which is not perforated. Top layer 20 is perforated, or alternately scored or embossed prior to assembly providing a line of weakness 29. Line of weakness 29 is aligned with gap in the absorbent layer 22 during assembly. In addition, it has been found that plastic sheet material made by the slot cast process is often somewhat easier to tear in its machine direction, i.e., the direction along which the material is made than in a direction transverse thereto, resulting in what is called linear tear. In addition, the linear tear feature can be enhanced by reducing the thickness of the film forming a line of weakness in the film which is aligned with the perforated line of weakness 29 in the top layer 20. The linear tear feature of bottom layer 24 can be enhanced by nicking the edge of the film at one or both of the ends adjacent to bend line 28. When sideways force is applied to separate cutting mat panels 52 and 54, the panels will separate along the line of weakness 29. One method of forming the perforations is with a rotary perforation wheel. Additionally, it may be possible to use a rotary die cutter, however, this may complicate the manufacturing process.

Where absorbent gaps are not present, the tear line also can be formed by other methods such as scoring or compression molding. The tear lines also can be formed in a nip created by a metal embossing roll and a metal, instead of rubber roll. This method is desirable where the top surface of the top layer 20 is to be printed upon since a

raised surface might interfere with some printing operations.

Examples

Description of Examples:

Example 1: Wood cutting board made of solid American hardwoods (Foley-Martens Co. 3300 Fifth St. NE, Minneapolis, MN 55418; Item number 74; Product description - Special Times Carving/serving board, Dimension 14" x 20"; UPC code 7207500773)

Example 2: 100% Acrylic cutting board and counter protector with non-slip feet (Acrylic Plastic Products, Inc. Jackson, Mississippi;, Dimensions 11" x 15", UPC code - 3695900104)

Example 3: Glass cutting board with sure grip feet (Corning Vitro Corporation, P.O. Box 1994, Waynesboro, VA 22980; tradename Corelle Coordinates Counter Saver, dimensions - 12" x 15", UPC code 7116014820)

Example 4: High density polyethylene cutting board (APP, Jackson MS, Product, dimensions 16" x 20"; UPC code 3695900406)

Example 5: Polymeric mat (OLFA product of Japan, tradename OLFA ROTOR MAT, dimensions 17.75" x 11.875", UPC code 91511 30014 7)

Example 6: Cutting mat of this invention includes top layer: (pulp side up) 65 gsm HYDROKNIT which is a hydroentangled base sheet composed of 0.4 OSY polypropylene spunbond and 50 GSM 100% virgin pulp which was subsequently printed on the pulp side at TUFCO Industries Inc. 3161 South Ridge Road, P.O. Box 23500, Green Bay, WI, 54305-3500 with the Hex pattern using, INX International Flexo W/B Travel Wipe Aqua ink, product code AW-14881; center layer 300 gsm James River blotter paper, supplied by Crown Vantage, 145 James Way, Southampton PA, 18966; bottom layer 0.75 mil polyethylene/Metallocene polyolefin coextruded cast film (Film identification number XC2-21-826.1) made by Consolidated Thermoplastics Company, P.O. Box 189, 1701 First Avenue, Chippewa Falls, WI 54729, materials are laminated together with Findley H2096 hotmelt spray adhesive, made by Findley Adhesives Inc., 11320 Watertown Plank Road, Wauwatosa, WI 53226.

Example 7: Pizza Hut delivery box, dimensions 14.25" x 14.5".

Example 8: Polymeric cutting mat (New Age Products, Inc., San Marcos, CA, tradename CHOP & CHOP!, The Original Flexible Cutting Mat, Patent Number 5472790; UPC code 4764350150)

Gurley Stiffness

The force needed to bend each sample is measured using a Gurley Model 4171-d

Digital Stiffness Tester which along with weights and calibration strips are available through Teledyne Gurley, Troy, N.Y. The Gurley stiffness test procedure is modeled after the Technical Association of the Pulp and Paper Industry (TAPPI) method T 543 pm-84. The Gurley Digital Stiffness Tester is an instrument consisting of a balanced vane, which is center-pivoted, and to which a variety of weights can be added below its pivot point. The vane moves freely to accommodate testing in both left and right directions which would be analogous to upward and outward body flexing of the samples.

There is a two part calibration to the Gurley Stiffness Tester. The first calibration is done to ensure that the "Vane" pendulum is swinging according to specification against a known material (i.e., a brass strip). The Gurley instrument is calibrated following the Gurley Digital Stiffness Tester Instruction Manual to within 5% variation with a 50.8 mm wide by 25.4 mm long Brass Calibration Strip, Gurley part no. 31644. The second calibration is done to ensure that the internal electronic calculations and conversions are accurate. The samples cut from each cutting mat example are 12.7mm wide by 101.6 mm long. Each sample overlaps the top of the Gurley vane by 6.4 mm. During a test, the sample is moved against the top edge of the vane until the sample bends and the vane releases contact with the bottom edge of the sample. The point of release is measured by an electronic optical encoder which provides a greater degree of accuracy over the earlier model Gurley Stiffness Tester as was used in TAPPIT 543 pm-84. The electronic optical encoder also displays the result on the digital readout. The readout continuously displays readings from tests performed in both the left and right directions. The Gurley Model 4171-d also computes automatically through an internal microprocessor and displays the average of left and right bending stiffness data after each measurement. The average reading is then converted by this Gurley instrument into milligrams of Gurley stiffness relative to a sample size of 25.4 mm wide by 76.2 mm long. The Gurley Stiffness Tester should be set up as follows. The required weight is attached and the base of the instrument is leveled by adjusting the leveling screw until the level's bubble is centered and the pendulum's pointer is indicating zero. The switches are set to correspond to the weight being used, the weight's position on the pendulum, the width of the specimen being tested, and the length of the specimen: The test procedure to be performed is as follows:

1. Center the specimen strip over the pendulum such that exactly 6.4 mm (0.25 inches) overlaps the top of the pendulum and exactly 6.4 mm (0.25 inches) will be held in the

jaws.

2. Select an appropriate weight and a hole to give a reading between 2 and 6 on the scale. The specimen should be brought to an approximate contact with the pendulum vane before applying force to avoid oscillation in the early stages.

3. Press the System Reset button. The display must read 00-000-00.

4. Press the Motor-Direction switch to cause the clamp arm to press the specimen against the pendulum.

5. Repeat step 4 in the opposite direction to establish both a left scale reading, a right scale reading, and an average reading.

6. Record the average scale reading.

7. Press the Select Button to attain the milligram calculation and record.

8. Repeat steps 1 through 7 for each specimen.

The following procedure should be used to obtain Gurley stiffness samples. A set of samples should be taken from each example. Five samples measuring 12.7 mm by 101.6 mm are cut from each mat. The five samples from each mat should be cut and handled carefully so as not to affect the sample stiffness. The Gurley stiffness is measured for each sample and the values are recorded. The average for the stiffness is calculated and recorded. The film side of Example 6 was dusted with Johnson's baby powder, IPC code 8137-003052, made by Johnson & Johnson Consumer Products Inc., Skillman NJ 08558-9418. Examples 5,6,7, and 8 were tested for Gurley Stiffness. The results are presented in Table 1.

Coefficient-of-Friction:

The coefficient of friction of the exterior of the bottom surface of cutting mat examples were measured by a modification to ASTM test number D-1894-93. ASTM test method D-1894-93 covers determination of the coefficients of starting and sliding friction of plastic film and sheeting when sliding over itself or other substances at specified test conditions. The test samples were measured by a modification of ASTM test D-1894-93. The modified test calls for determination of sliding friction of the exterior of the bottom surface layer by wrapping a 200 gram sled with brass shim stock and sliding the sled with shim stock over the test sample at 0.5 feet/minute. Test equipment used includes TMI Monitor slip and friction tester Model number 32-06, a 200 gram sled, serial number A28734, and 0.005" (0.127 mm) brass shim stock standard surface 90 which was assembled as follows: Shim stock made by Precision Brand Products Inc., UPC Code 17305 (1755) is cut and shaped as shown in Figures 10 and 11. The shim

stock standard surface 90 has a dimension 70 of 2.55 inches, a dimension 72 of 3.235 inches, a dimension 74 of 0.375 inches, and a dimension 76 of 0.31 inches. Standard surface 90 is bent along lines 78 and 80 as shown in Fig. 10 into a j-shaped configuration as shown in Fig. 11. The bend lines have a radius of about 0.05 inches. The standard surface 90 is attached to the 200 gram sled as shown in Fig. 12. The test samples were clamped in place on the test equipment stainless steel plate with the exterior of the bottom surface of the cutting mat facing up. Two of the examples 1 and 4, which were too thick to slide under the load cell were milled to a thickness of 0.25 inches. COF tests were conducted on the unmilled surfaces only. The results are presented in Table 1.

TABLE 1

EXAMPLE	GURLEY STIFFNESS (milligrams)	COF BOTTOM SURFACE
1	-	0.217
2	-	0.177
3	-	0.259
4	-	0.126
5	55750	0.256
6	10384	1.272
7	78079	0.168
8	6881	0.202

Time to Absorb Water

For the time of absorption of water, a modified form of ASTM D 824-94; "Standard Method for Rate of Absorption of Water by Bilbulous Papers." was used. Equipment used included a first syringe capable of reading to the nearest 0.01 ml with a capacity of 1.0 ml; a second syringe capable of reading to the nearest 0.1 ml with a capacity of 10.0 ml; stopwatch capable of reading to the nearest 0.01 second; light source consisting of a fluorescent light positioned approximately two feet off the surface and two feet behind samples and deionized water.

The test procedure was varied as follows: five samples of each example were tested at the 10 ml level and at the 0.1 ml level and ten samples of each were tested at the 1.0 ml level; no specimen support was used other than the bench top; time of absorption was measured at 0.1 ml, 1.0 ml and 10.0 ml; pieces of string were placed onto the cutting mat samples forming a 9 cm by 9 cm grid, the water was added to the center of each grid square; the test was terminated after 90 minutes (samples that required more than 90 minutes were indicated as having an expired time of >5400 seconds.); and the results were recorded in seconds. The results are presented in

Table 2.

TABLE 2

EXAMPLE	ABSORPTION TIME for 0.1 ml, seconds	ABSORPTION TIME for 1.0 ml, seconds	ABSORPTION TIME for 10.0 ml, seconds
1	>5400	>5400	>5400
2	>5400	>5400	>5400
3	>5400	>5400	>5400
4	>5400	>5400	>5400
5	>5400	>5400	>5400
6	8	7	144
7	1682	3802	>5400
8	>5400	>5400	>5400

Durometer Hardness:

For surface hardness, ASTM D2240-91 was used. Test equipment used included Shore Instruments and Manufacturing Company type D-2 durometer hardness tester. For Examples 1 through 4 only one layer of material was tested. For Examples 5 and 7, four layers were plied up to obtain a thickness greater than 0.25". For Examples 6 and 8, ten layers of each material were plied up to obtain a thickness greater than 0.25". The results are presented in Table 3.

TABLE 3

EXAMPLE	(D-SCALE) HARDNESS
1	65.2
2	87.2
3	93.4
4	67.6
5	70.0
6	29.2
7	30.4
8	66.2

Absorbent Capacity:

For absorbent capacity, the following test procedure was used. Test equipment used included balance scale accurate to 0.01 gram and dipping container of 0.9% saline solution. The saline solution was maintained at 35 + or - 1 degree C. For Examples 1, 4, and 6-8, three 2.5 inch by 2.5 inch samples of example were tested. Each sample was weighed and the dry weight recorded to 0.01 gram. Each sample was then submerged in the saline solution for 15 seconds. It was then removed and allowed to drain while one corner was gripped with tongs. Each sample was then weighed and the wet weight recorded to 0.01 gram. The capacity was determined by

subtracting the dry weight from the wet weight and dividing the difference by the dry weight. The results for absorbent capacity are presented in Table 4.

TABLE 4

EXAMPLE	ABSORBENT CAPACITY g/g
1	0.04
4	0.01
6	2.21
7	1.21
8	0.11

While the invention has been described in conjunction with several specific embodiments, it is to be understood that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, this invention is intended to embrace all such alternatives, modifications and variations which fall within the spirit and scope of the appended claims.

We Claim:

1. A disposable mat for use in cutting food comprising an absorbent layer having a top surface in contact with the food for cutting wherein said absorbent layer is formed of a liquid absorptive material to absorb liquid released from the food during cutting thereby preventing liquid from spilling from the mat.

2. A disposable cutting mat of claim 1 wherein absorbent layer has an absorbent capacity greater than about 1.5 g of released liquid per gram of mat.

3. A disposable cutting mat of claim 1 wherein the mat has a time to absorb 1 ml of deionized water of less than about 1000 seconds.

4. A disposable cutting mat of claim 2 wherein the mat has a time to absorb 1 ml of deionized water of less than about 1000 seconds.

5. A disposable cutting mat of claim 1, wherein a Shore hardness of the mat is less than about 60 (D-scale).

6. A disposable cutting mat of claim 1 having a thickness less than about 15 mm.

7. A disposable cutting mat of claim 1 wherein the mat has a bottom surface in contact with a support surface, the bottom surface having a Coefficient of Friction greater than about 0.4 and does not adhere to the support surface.

8. A disposable cutting mat of claim 1 wherein the absorbent layer comprises a plurality of sections, said sections being hinged therebetween.

9. A disposable cutting mat of claim 8 wherein the sections are separable.

10. A disposable cutting mat of claim 1 wherein the mat comprises additionally a liquid impervious layer associated with the absorbent layer and located between the absorbent layer and the bottom surface.

11. A disposable cutting mat of claim 1 wherein the top surface comprises antibacterial ingredients.

12. A disposable cutting mat of claim 1 wherein the mat comprises additionally a top layer associated with the absorbent and located between the absorbent layer and the top surface.

13. A disposable cutting mat of claim 12 wherein the top layer has a Shore hardness of less than about 60 (D-scale).

14. A disposable cutting mat of claim 12 wherein absorbent capacity of the absorbent layer is greater than about 1.5 g of released liquid per gram of mat.

15. A disposable cutting mat of claim 12 wherein the mat has a time to absorb 1 ml of deionized water of less than about 1000 seconds.

16. A disposable cutting mat of claim 14 wherein the mat has a time to absorb 1 ml of deionized water of less than about 1000 seconds.

17. A disposable cutting mat of claim 12 wherein the mat has a bottom surface in contact with a support surface, the bottom surface having a Coefficient of Friction greater than about 0.4 and does not adhere to the support surface.

18. A disposable cutting mat of claim 12 wherein the absorbent layer comprises a plurality of sections, said sections being hinged therebetween.

19. A disposable cutting mat of claim 12 wherein the cutting mat comprises additionally a liquid impervious layer associated with the absorbent layer and located between the absorbent layer and the bottom surface.

20. A disposable cutting mat of claim 19 wherein the mat has a time to absorb 1 ml of deionized water of less than about 1000 seconds.

21. A disposable cutting mat of claim 20 wherein the top layer has a Shore hardness of less than about 60 (D-scale).

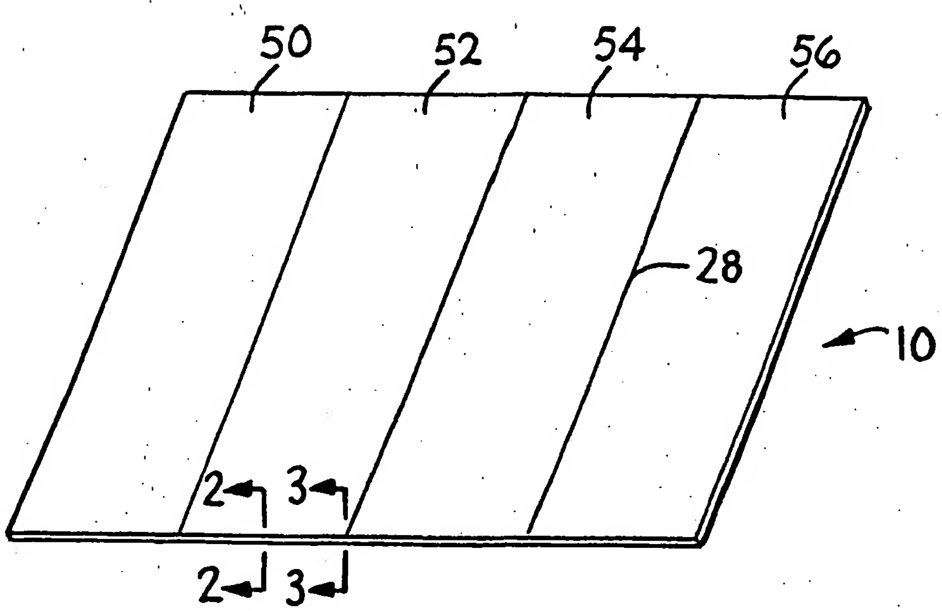


FIG. 1

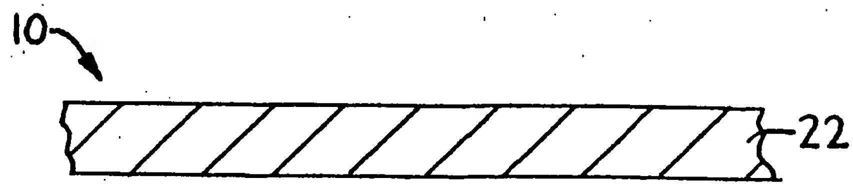


FIG. 2

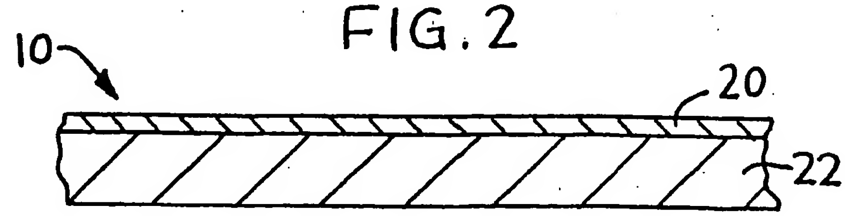


FIG. 3

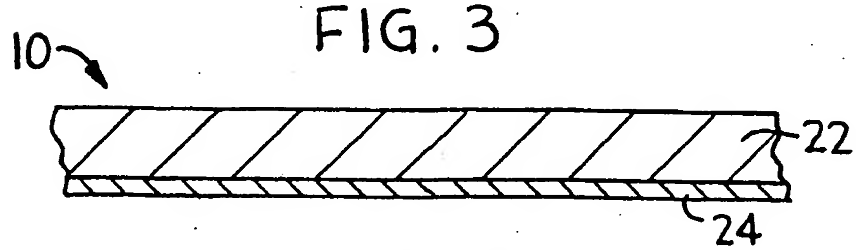


FIG. 4

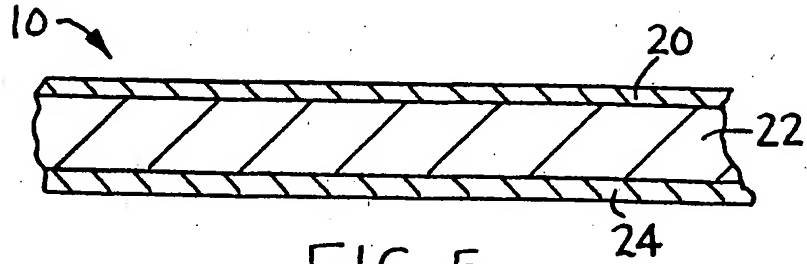


FIG. 5

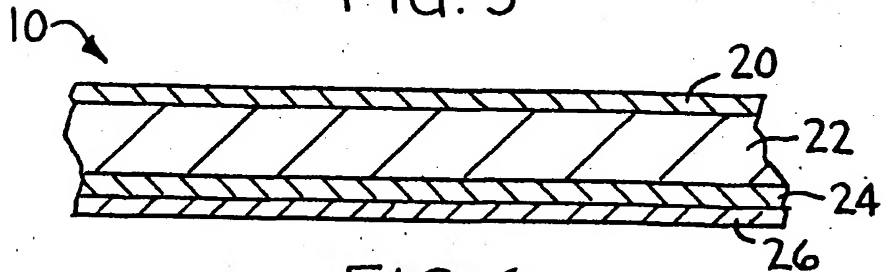


FIG. 6

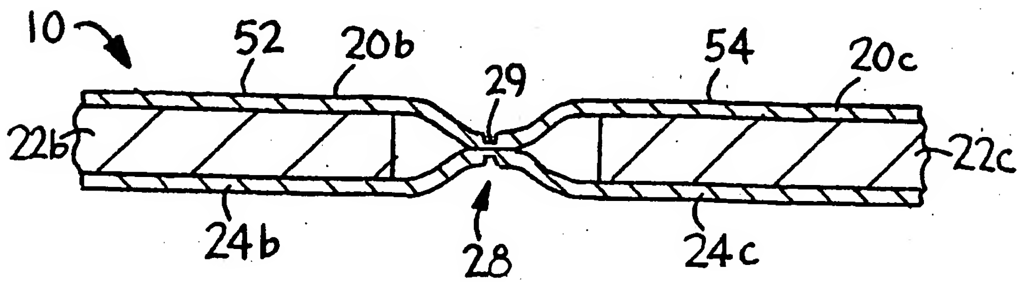


FIG. 7

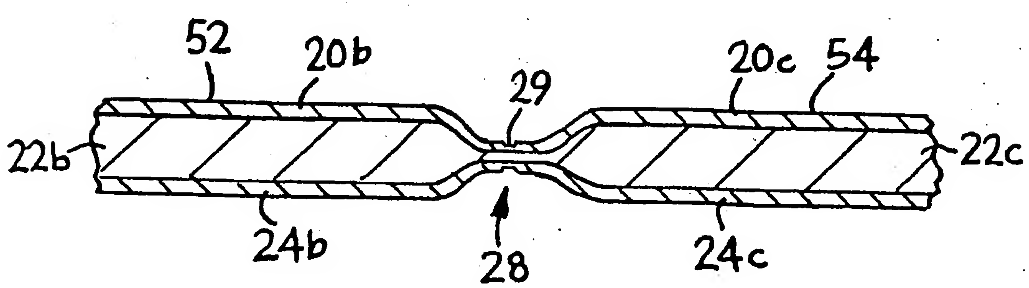


FIG. 8

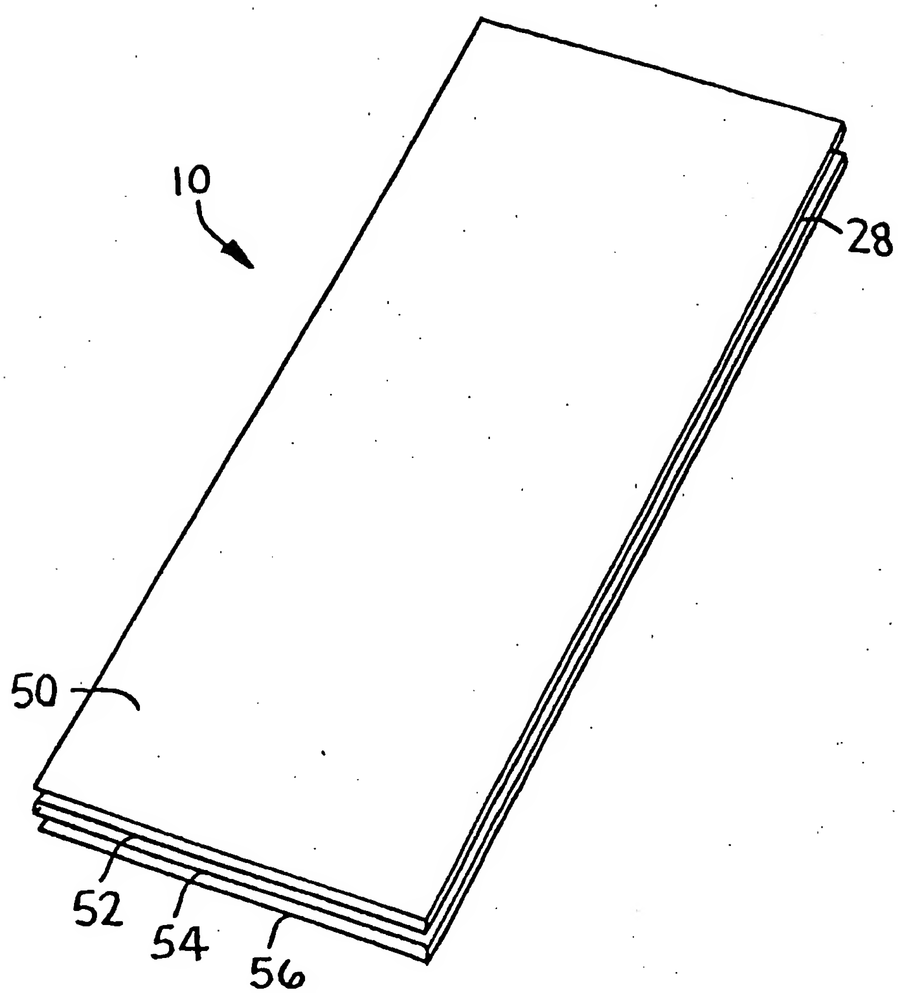


FIG. 9

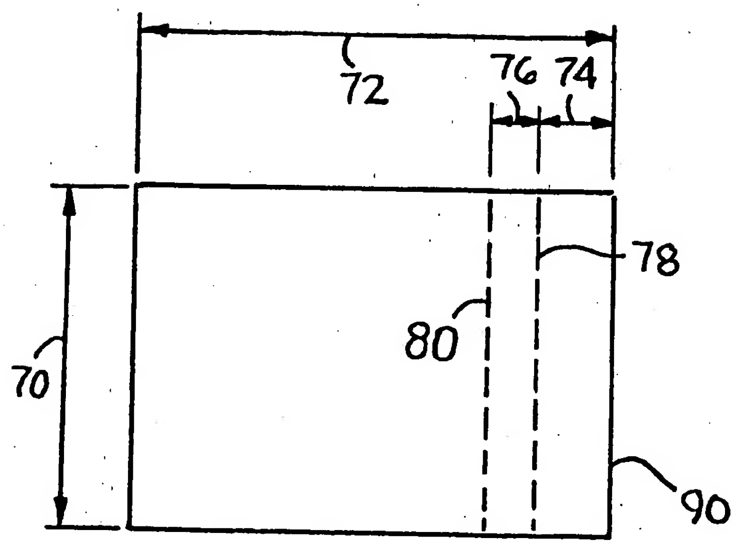


FIG. 10

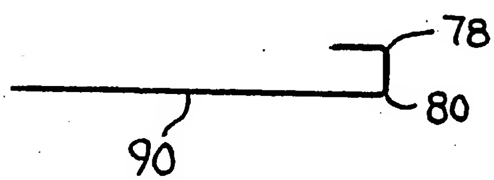


FIG. 11

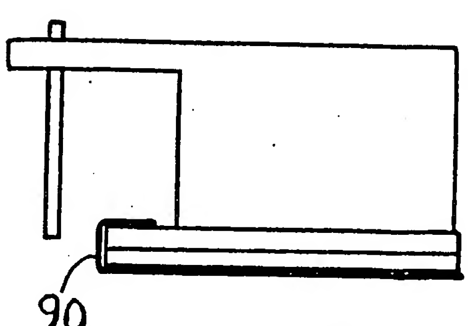


FIG. 12